

(a) providing at least forty-nine unique combinations of at least seven different compounds,

(b) contacting each unique combination with living test cells under conditions that ensure that each contacting is segregated from the others,

(c) measuring or detecting said biological property of the test cells as an indication of the effect of each combination on the test cells,

(d) identifying a combination that affects said biological property of the test cells in said way that is indicative of the potential for therapeutic efficacy, and

(e) at any time during said method, contacting each compound in the combination identified in step (d) with said living test cells and thereafter measuring or detecting said biological property of the test cells as an indication of the effect of each compound on the test cells, wherein the combination identified in step (d) constitutes said desired combination if the effect of the combination on said biological property of the test cells is qualitatively or quantitatively superior to the effect of each compound, individually, on said biological property of the test cells.

90. (New) The method of claim 89, wherein step (b) comprises sequentially contacting said combinations of compounds with said test cells.

91. (New) The method of claim 89, wherein said detecting step (c) is performed by a cyto blot assay.

92. (New) The method of claim 89, wherein said detecting step (c) is performed by a reporter gene assay.

93. (New) The method of claim 89, wherein said detecting step (c) is performed by a fluorescence resonance energy transfer assay.

94. (New) The method of claim 89, wherein said detecting step (c) is performed by detecting a fluorescent calcium-binding indicator dye.
95. (New) The method of claim 89, wherein said detecting step (c) employs fluorescence microscopy.
96. (New) The method of claim 89, wherein step (c) employs expression profiling.
97. (New) The method of claim 89, wherein said cells are human cells.
98. (New) The method of claim 89, wherein said cells are selected from the group consisting of cancer cells, immune cells, neurons, fibroblasts, bacterial cells, and fungal cells.
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99. (New) The method of claim 89, wherein step (b) is carried out using a robotics system.
100. (New) The method of claim 89, wherein step (b) is carried out using microfluidics.
101. (New) The method of claim 89, wherein step (b) is carried out using ink-jet printer technology.
102. (New) The method of claim 89, wherein said compounds are selected from the group consisting of non-polymeric organic compounds, lipids, carbohydrates, peptides, inorganic compounds, and oligonucleotides.
103. (New) The method of claim 89, wherein at least one of said compounds is employed in purified form.
104. (New) The method of claim 103, wherein each of said compounds is employed in purified form.
105. (New) The method of claim 89, wherein said compounds are provided as components of mixtures.
106. (New) The method of claim 105, wherein said mixtures are natural product extracts.
107. (New) The method of claim 89, wherein said effect is a synergistic effect.

108. (New) The method of claim 89, wherein at least one of said compounds is a molecule with a molecular weight of less than 1500 g/mole.

109. (New) The method of claim 108, wherein said molecule is an FDA-approved drug.

110. (New) The method of claim 108, wherein each of said compounds is a molecule with a molecular weight of less than 1500 g/mole.

111. (New) The method of claim 110, wherein said each of said compounds are FDA-approved drugs.

112. (New) The method of claim 89, wherein each of said combinations screened for biological activity is a two-compound combination.

113. (New) The method of claim 89, wherein each of said combinations screened for biological activity is a three-compound combination.

114. (New) A method of discovering a desired two or higher order combination of compounds having the ability to affect a biological property of living cells in a way that is indicative of the potential for therapeutic efficacy in an animal, said method comprising the steps of:

(a) providing at least two hundred unique combinations of at least seven different compounds,

(b) contacting each unique combination with living test cells under conditions that ensure that each contacting is segregated from the others,

(c) measuring or detecting said biological property of the test cells as an indication of the effect of each combination on the test cells,

(d) identifying a combination that affects said biological property of the test cells in said way that is indicative of the potential for therapeutic efficacy, and

(e) at any time during said method, contacting each compound in the combination identified in step (d) with said living test cells and thereafter measuring or detecting said biological property of the test cells as an indication of the effect of each compound on the test cells, wherein the combination identified in step (d) constitutes said desired combination if the effect of the combination on said biological property of the test cells is qualitatively or quantitatively superior to the effect of each compound, individually, on said biological property of the test cells.

115. (New) The method of claim 114, wherein step (b) comprises sequentially contacting said compounds with said test cells.

116. (New) The method of claim 114, further comprising the step of (f) repeating step (a) through (e) at least twice, wherein, in step (b), said contacting of at least 200 combinations is different in each repetition.

117. (New) The method of claim 116, wherein at least two repetitions of step (f) occur within 10 days of each other.

118. (New) The method of claim 114, wherein said contacting step (b) comprises contacting at least 400 unique two or higher order combinations of compounds and said compounds individually with living test cells.

119. (New) The method of claim 114, wherein said contacting step (b) comprises contacting at least 1540 unique two or higher order combinations of compounds and said compounds individually with living test cells.

120. (New) The method of claim 114, wherein said compounds are selected from the group consisting of non-polymeric organic compounds, lipids, carbohydrates, peptides, inorganic compounds, and oligonucleotides.

121. (New) The method of claim 114, wherein at least one of said compounds is employed in purified form.

122. (New) The method of claim 114, wherein each of said compounds is employed in purified form.

123. (New) The method of claim 114, wherein said compounds are provided as components of mixtures.

124. (New) The method of claim 123, wherein said mixtures are natural product extracts.

125. (New) The method of claim 114, wherein said effect is a synergistic effect.

126. (New) The method of claim 114, wherein step (b) is carried out using a robotics system.

127. (New) The method of claim 114, wherein step (b) is carried out using microfluidics.

128. (New) The method of claim 114, wherein step (b) is carried out using ink-jet printer technology.

129. (New) The method of claim 114, wherein at least one of said compounds is a molecule with a molecular weight of less than 1500 g/mole..

130. (New) The method of claim 129, wherein said molecule is an FDA-approved drug.

131. (New) The method of claim 129, wherein each of said compounds is a molecule with a molecular weight of less than 1500 g/mole.

132. (New) The method of claim 131, wherein said small compounds are FDA-approved drugs.

133. (New) The method of claim 114, wherein each of said combinations screened for biological activity is a two-compound combination.

134. (New) The method of claim 114, wherein each of said combinations screened for biological activity is a three-compound combination.

135. (New) A method of discovering a desired two or higher order combination of compounds having the ability to affect a biological property of living cells in a way that is indicative of the potential for therapeutic efficacy in an animal, said method comprising the steps of:

- (a) providing at least forty-nine unique combinations of at least seven different compounds,
- (b) contacting each unique combination with living test cells under conditions that ensure that each contacting is segregated from the others,
- (c) measuring or detecting said biological property of the test cells as an indication of the effect of each combination on the test cells,
- (d) identifying a combination that affects said biological property of the test cells in said way that is indicative of the potential for therapeutic efficacy,
- (e) at any time during said method, contacting each compound in the combination identified in step (d) with said living test cells and thereafter measuring or detecting said biological property of the test cells as an indication of the effect of each compound on the test cells, wherein the combination identified in step (d) constitutes said desired combination if the effect of the combination on said biological property of the test cells is qualitatively or quantitatively superior to the effect of each compound, individually, on said biological property of the test cells, and
- (f) repeating steps (a) through (e) at least 25 times over a one-week period, using different combinations of compounds in each repetition.

136. (New) The method of claim 135, wherein steps (a) through (e) are repeated at least 100 times over a 30-day period, using different combinations of compounds in each repetition.

137. (New) The method of claim 135, wherein said compounds are selected from the group consisting of non-polymeric organic compounds, lipids, carbohydrates, peptides, inorganic compounds, and oligonucleotides.

138. (New) The method of claim 135, wherein said compounds are employed in purified form.

139. (New) The method of claim 135, wherein said compounds are provided as components of mixtures.

140. (New) The method of claim 139, wherein said mixtures are natural product extracts.

141. (New) The method of claim 135, wherein said effect is a synergistic effect.

142. (New) The method of claim 135, wherein step (b) is carried out using a robotics system.

143. (New) The method of claim 135, wherein step (b) is carried out using microfluidics.

144. (New) The method of claim 135, wherein step (b) is carried out using ink-jet printer technology.

145. (New) The method of claim 135, wherein at least one of said compounds is a molecule with a molecular weight of less than 1500 g/mole.

146. (New) The method of claim 145, wherein said molecule is an FDA-approved drug.

147. (New) The method of claim 145, wherein each of said compounds is a molecule with a molecular weight of less than 1500 g/mole.

148. (New) The method of claim 147, wherein said compounds are FDA-approved drugs.

149. (New) A method of discovering a desired two or higher order combination of compounds having

the ability to affect a biological property of living cells in a way that is indicative of the potential for therapeutic efficacy in an animal, said method comprising the steps of:

(a) providing at least ten thousand unique combinations of at least seven different compounds,

(b) contacting each unique combination with living test cells under conditions that ensure that each contacting is segregated from the others,

(c) measuring or detecting said biological property of the test cells as an indication of the effect of each combination on the test cells,

(d) identifying a combination that affects said biological property of the test cells in said way that is indicative of the potential for therapeutic efficacy,

(e) at any time during said method, contacting each compound in the combination identified in step (d) with said living test cells and thereafter measuring or detecting said biological property of the test cells as an indication of the effect of each compound on the test cells, wherein the combination identified in step (d) constitutes said desired combination if the effect of the combination on said biological property of the test cells is qualitatively or quantitatively superior to the effect of each compound, individually, on said biological property of the test cells, and

(f) repeating steps (a) through (e) at least twice over a period of ten days or less, wherein, in step (a), said step of providing at least ten thousand unique combinations of at least seven different compounds is different in two or more repetitions.

150. (New) The method of claim 149, wherein at least one of said compounds is a molecule with a molecular weight of less than 1500 g/mole.

151. (New) The method of claim 150, wherein said molecule is an FDA-approved drug.

152. (New) The method of claim 150, wherein each of said compounds is a molecule with a molecular weight of less than 1500 g/mole.



153. (New) The method of claim 152, wherein said compounds are FDA-approved drugs.

154. (New) A method of discovering a desired two or higher order combination of compounds having the ability to affect a biological property of living cells in a way that is indicative of the potential for therapeutic efficacy in an animal, said method comprising the steps of:

(a) contacting living test cells with at least 100 compounds under conditions that ensure that each compound/test cell contacting is segregated from the others,

(b) detecting or measuring a biological property of said test cells,

(c) selecting compounds that cause a change in said biological property relative to said biological property of said test cells not contacted with said compounds,

(d) contacting at least 49 unique two or higher order combinations of the selected compounds of step (c) with living test cells under conditions that ensure that each contacting is segregated from the others,

(e) detecting or measuring a biological property of said test cells of step (d), and

(f) identifying combinations of compounds that cause an effect on said biological property of said test cells that is different from the effect of each compound of the combination by itself, wherein said identified combinations of compounds have potential therapeutic use in an animal.

155. (New) The method of claim 154, wherein the test cells of step (a) are the same as the test cells of step (d).

156. (New) The method of claim 154, wherein the biological property of step (b) is the same as the biological property of step (d).